

C L A I M S

We claim:

1. A DC power pooling system for an Ethernet network comprising:
 - a plurality of DC electrical power consuming and providing Ethernet nodes, each of said plurality of DC electrical power consuming and providing Ethernet nodes having at least a first operative mode in which it may provide more electrical power than it consumes and a second operative mode in which it may consume more electrical power than it provides;
 - electrical power interconnections, interconnecting said plurality of DC electrical power consuming and providing Ethernet nodes and permitting electrical power flow thereto and therefrom; and
 - at least one controller in communication with said plurality of DC electrical power consuming and providing Ethernet nodes and being operative to employ said communication to govern electrical power provided by at least one of said plurality of DC electrical power consuming and providing Ethernet nodes.
2. A DC power pooling system for an Ethernet network according to claim 1, wherein each of said plurality of DC electrical power consuming and providing Ethernet nodes comprises at least one DC electrical power source and at least one electrical power load.
3. A DC power pooling system for an Ethernet network according to claim 2, wherein said DC electrical power source receives AC mains power and converts said AC mains power to DC electrical power.
4. A DC power pooling system for an Ethernet network according to claim 2, further comprising at least one power sharing circuit associated with said at least one DC electrical power source, said at least one power sharing circuit being responsive to an output of said at least one controller to govern electrical power provided by said at least one DC electrical power source.

5. A DC power pooling system for an Ethernet network according to claim 4, wherein said at least one DC electrical power source comprises a power source controller, and wherein said at least one power sharing circuit is operable to modify the operation of said power supply controller.

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6. A DC power pooling system for an Ethernet network according to claim 1, wherein said controller receives for each of said plurality of DC electrical power consuming and providing Ethernet nodes information relating to DC electrical power needs and DC electrical power providing capabilities.

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7. A DC power pooling system for an Ethernet network according to claim 2, wherein said controller receives at least one of electrical load, DC electrical providing ability and percentage of available power being supplied of said DC electrical power source at least one of said DC electrical power consuming and providing Ethernet nodes.

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8. A DC power pooling system for an Ethernet network according to claim 1, further comprising a supply interface unit associated with at least one of said DC electrical power interconnections, said supply interface unit being responsive to an output of said at least one controller to govern electrical power provided by said at least one of said plurality of DC electrical power consuming and providing Ethernet nodes.

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9. A DC power pooling system for an Ethernet network according to claim 8, wherein said supply interface unit comprises at least one adjustable current limiter responsive to an output of said at least one controller, said at least one adjustable current limiter being operative for limiting at least one of said electrical power flow to at least one of said plurality of DC electrical power consuming and providing Ethernet nodes and from at least one of said plurality of DC electrical power consuming and providing Ethernet nodes.

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10. A DC power pooling system for an Ethernet network according to claim 8, wherein said supply interface unit comprises at least one current sensor, said at least one

current sensor being operative for sensing at least one of electrical power flow to at least one of said plurality of DC electrical power consuming and providing Ethernet nodes and from at least one of said plurality of DC electrical power consuming and providing Ethernet nodes.

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11. A DC power pooling system for an Ethernet network according to claim 10, wherein said supply interface unit comprises a telemetry output operable to communicate with said at least one controller, said telemetry output comprising information regarding at least one of direction and extent of electrical power flow.

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12. A DC power pooling system for an Ethernet network according to claim 1, wherein at least one of said plurality of DC electrical power consuming and providing Ethernet nodes comprises a temperature indicating output, wherein said at least one of said plurality of DC electrical power consuming and providing Ethernet nodes 15 communicates information regarding said temperature indicating output to said at least one controller.

13. A DC power pooling system for an Ethernet network according to claim 4, wherein power sharing circuit comprises a temperature sensor having a temperature indicating output, said at least one power sharing circuit being operable to communicate 20 information regarding said temperature indicating output to said at least one power controller.

14. A DC power pooling system for an Ethernet network according to claim 1, 25 wherein at least one of said plurality of DC electrical power consuming and providing Ethernet nodes comprises at least one of a modem, a switch, a switch providing power over Ethernet and operating in accordance with IEEE 802.3af Standard, an Internet Protocol telephone, a computer, a server, a camera, an access controller, a smoke sensor, a wireless access point and a battery pack module.

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15. A DC power pooling system for an Ethernet network according to claim 1, further comprising an overcurrent protection circuit associated with at least one of said DC electrical power interconnections.

5 16. A DC power pooling system for an Ethernet network according to claim 15, wherein said overcurrent protection circuit comprises at least one of a fuse and a circuit breaker operative to prevent excess electrical power flow.

10 17. A DC power pooling system for an Ethernet network according to claim 1, further comprising a power supply module interconnected with at least one of said DC electrical power interconnections, said power supply module being operative to supply power to at least one of said DC electrical power consuming and providing Ethernet nodes in said second mode.

15 18. A DC power pooling system for an Ethernet network according to claim 1, further comprising a power supply module interconnected with at least one of said DC electrical power interconnections, wherein said power supply module supplies power in response to an output of said at least one controller to at least one of said plurality of DC electrical power consuming and providing Ethernet nodes when said at least one of said 20 plurality of DC electrical power consuming and providing Ethernet nodes is operative in said second mode.

19. A DC power pooling system for an Ethernet network according to claim 1, further comprising a battery pack module interconnected with at least one of said DC 25 electrical power interconnections, said battery pack module being operative to supply power to at least one of said plurality of DC electrical power consuming and providing Ethernet nodes when said at least one of said plurality of DC electrical power consuming and providing Ethernet node is operative in said second mode.

20. A DC power pooling system for an Ethernet network according to claim 1, wherein at least one of said DC electrical power interconnections are arranged in one of a hierarchical star topology and a hierarchical ring topology.

5 21. A method of DC power pooling for a plurality of nodes of an Ethernet network comprising:

providing a plurality of DC electrical power consuming and providing Ethernet nodes, each of said plurality of DC electrical power consuming and providing Ethernet nodes having at least a first operative mode in which it may provide 10 more electrical power than it consumes and a second operative mode in which it may consume more electrical power than it provides;

providing at least one controller in data communication with said plurality of DC electrical power consuming and providing Ethernet nodes;

interconnecting said plurality of DC electrical power consuming 15 and providing Ethernet nodes thereby permitting interchange electrical power thereto and therefrom; and

governing said interchange of electrical power in response to an output of said at least one controller, thereby enabling DC power pooling.

20 22. A method of DC power pooling for a plurality of nodes of an Ethernet network according to claim 21, wherein each of said plurality of DC electrical power consuming and providing Ethernet nodes comprises at least one DC electrical power source and at least one electrical power load.

25 23. A method of DC power pooling for a plurality of nodes of an Ethernet network according to claim 21, further comprising:

receiving AC mains power by said each of said plurality of DC electrical power consuming and providing Ethernet nodes;

converting said AC mains power to DC power; and

providing said DC power to said at least one electrical power load located in said each of said plurality of DC electrical power consuming and providing Ethernet nodes.

5 24. A method of DC power pooling for a plurality of nodes of an Ethernet network according to claim 22, further comprising:

providing at least one power sharing circuit associated with said at least one DC electrical power source, and wherein said varying is accomplished by said at least one power sharing circuit.

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25. A method of DC power pooling for a plurality of nodes of an Ethernet network according to claim 24, wherein said at least one DC electrical power source comprises a power supply controller, and wherein said varying is accomplished by modifying the operation of said power supply controller.

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26. A method of DC power pooling for a plurality of nodes of an Ethernet network according to claim 21, further comprising:

receiving for each of said plurality of DC electrical power consuming and providing Ethernet nodes information relating to DC electrical power needs and DC electrical power providing capabilities,

20 wherein said governing is accomplished at least partially in response to said received information.

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27. A method of DC power pooling for a plurality of nodes of an Ethernet network according to claim 22, further comprising:

receiving by said controller at least one of power consuming needs from said electrical load, power providing abilities from said DC electrical power source and percentage of available power being supplied of said DC electrical power source of said DC electrical power source.

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28. A method of DC power pooling for a plurality of nodes of an Ethernet network according to claim 21, further comprising:

providing a supply interface unit associated with at least one of said plurality of DC electrical power consuming and providing Ethernet nodes; and

5 controlling said electrical power flow in response to an output of said at least one controller.

29. A method of DC power pooling for a plurality of nodes of an Ethernet network according to claim 28, wherein said controlling comprises:

10 limiting at least one of said electrical power flow to at least one of said plurality of DC electrical power consuming and providing Ethernet nodes and from at least one of said plurality of DC electrical power consuming and providing Ethernet nodes.

15 30. A method of DC power pooling for a plurality of nodes of an Ethernet network according to claim 28, further comprising:

sensing at least one of said electrical power flow to at least one of said plurality of DC electrical power and consuming Ethernet nodes and from at least one of said plurality of DC electrical power and consuming Ethernet nodes.

20 31. A method of DC power pooling for a plurality of nodes of an Ethernet network according to claim 30, further comprising:

communicating information relating to at least one of direction and amount of electrical power flow sensed by said sensing to said at least one controller.

25 32. A method of DC power pooling for a plurality of nodes of an Ethernet network according to claim 21, further comprising:

sensing a temperature of at least one said plurality of DC electrical power consuming and providing Ethernet nodes; and

30 communicating information relating to said sensed temperature to said at least one controller.

33. A method of DC power pooling for a plurality of nodes of an Ethernet network according to claim 24, further comprising:

5 sensing a temperature of said at least one DC electrical power
source;

communicating information relating to said sensed temperature to said at least one controller.

34. A method of DC power pooling for a plurality of nodes of an Ethernet
10 network according to claim 21, wherein at least one of said plurality of DC electrical
power consuming and providing Ethernet nodes comprises at least one of a modem, a
switch, a switch providing power over Ethernet and operating in accordance with IEEE
802.3af Standard, an Internet Protocol telephone, a computer, a server, a camera, an
access controller, a smoke sensor, a wireless access point and a battery pack module.

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35. A method of DC power pooling for a plurality of nodes of an Ethernet network according to claim 21, further comprising:

protecting at least one of said plurality of DC electrical power consuming and providing Ethernet nodes against excess electrical power flow.

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36. A method of DC power pooling for a plurality of nodes of an Ethernet network according to claim 35, wherein said protecting comprises:

providing at least one of a fuse and a circuit breaker operative to prevent excess electrical power flow.

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37. A method of DC power pooling for a plurality of nodes of an Ethernet network according to claim 21, further comprising:

providing a power supply module;

30 interconnecting said power supply module with said interconnected plurality of DC electrical power consuming and providing Ethernet nodes; and

supplying power from said power supply module to at least one of said plurality of DC electrical power consuming and providing Ethernet nodes when said at least one of said plurality of DC electrical power consuming and providing Ethernet nodes is operative in said second mode.

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38. A method of DC power pooling for a plurality of nodes of an Ethernet network according to claim 21, further comprising:

providing a power supply module;
interconnecting said power supply module with said interconnected plurality of DC electrical power consuming and providing Ethernet nodes; and
supplying power from said power supply module in response to an output of said at least one controller to at least one of said plurality of DC electrical power consuming and providing Ethernet nodes when said in said at least one of said plurality of DC electrical power consuming and providing Ethernet nodes is operative in
15 said second mode.

39. A method of DC power pooling for a plurality of nodes of an Ethernet network according to claim 21, further comprising:

providing a battery pack module;
interconnecting said battery pack module with said interconnected plurality of DC electrical power consuming and providing Ethernet nodes; and
supplying power from said battery pack module to at least one of said plurality of DC electrical power consuming and providing Ethernet nodes when said at least one of said plurality of DC electrical power consuming and providing Ethernet
25 nodes is operative in said second mode.

40. A method of DC power pooling for a plurality of nodes of an Ethernet network according to claim 21, wherein said interconnecting is done in at least one of a hierarchical star topology and a hierarchical ring topology.

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